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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/945,101	08/31/2001	Jose Joaquin Garcia-Luna-Aceves	UC2000-356-2	2136

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EXAMINER	
BHANDARI, PUNEET	
ART UNIT	**PAPER NUMBER**
2666	

DATE MAILED: 04/15/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/945,101	GARCIA-LUNA-ACEVES ET AL.	
	Examiner	Art Unit	
	Puneet Bhandari	2666	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *31 August 2001*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-30* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-30* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *31 August 2001* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *3/19/2002*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims **1-30** are rejected under 35 U.S.C. 102(b) as being clearly anticipated by printed publication *"A Practical Framework for Minimum-Delay Routing in Computer Network*" by Srinivas Vutukury et al. on August 27, 1999.

Regarding claim **1**, a method of routing traffic between a source router and a destination router within multi-path network is anticipated by *"new frame work for approximate solutions to MDRP"* disclosed on page 3, paragraph 4, lines 1-11, comprising:

Determining multiple loop-free paths of unequal cost to destination router in response to long-term link-cost information is anticipated by *"multiple loop free paths of unequal cost to destination are first established using long-term link-cost information"* disclosed on page 3, paragraph 4, lines 1-3;

Allocating a route to said destination router along one of said multiple loop-free paths is anticipated by *"allocations of flows to destination along the multiple loop-free paths available at each router"* disclosed on page 3, paragraph 4, lines 3-4; and

Adjusting routing parameters available to each router in response to short-term link-cost information to incrementally adjust route allocation is anticipated by *"adjusting*

the routing parameter to minimize delay using short term link cost" disclosed on page 3, paragraph 4, lines 4-8;

Regarding claim **2**, wherein said long-term link-cost information is determined within said routers by executing heuristic programming to update successor set information at each router is anticipated by *"heuristic function that determines the routing parameter"* disclosed on page 8, paragraph 1, lines 1-8.

Regarding claim **3**, wherein said short term link cost information is determined within said router by executing heuristic programming to update routing parameters at each router is anticipated by *"heuristic function that determines the routing parameter"* disclosed on page 8, paragraph 1, lines 1-8.

Regarding claim **4**, wherein said short term link-cost information is computed by each router in response to information received within link-state update messages or equivalent is anticipated by *"each router has sufficient link-state information to compute shortest paths to all destination"* disclosed on page 10, paragraph 4, lines 1-6.

Regarding claim **5**, wherein said link-state update message indicate that an addition deletion or change in link-cost has occurred is anticipated by "information is exchanged between routers is a link-state update message" disclosed in page 11, paragraph 1, lines 1-3.

Regarding claim **6**, wherein allocating of said route does not require global synchronization on the network is anticipated by "*routing algorithm does not require any global variables or global synchronization"* disclosed on page 3, paragraph 4, lines 8-11

Whereby said routing method is able to respond to rapidly-changing traffic conditions within said network is anticipated by *"load balancing scheme based on some heuristic which can quickly adapt to dynamic traffic "*disclosed on page 7, paragraph 3, lines 1-5

Regarding claim **7,** wherein said short term link cost information is gathered at intervals of length T_s is anticipated by "link cost measured over short interval of length T_s" disclosed on page 16, paragraph 1, lines 1-6; and

Wherein said short-term link cost information is utilized to adjust the routing-parameters of routers along said loop free path is anticipated by "*link cost measured over short interval of length T_s are used for routing parameter computations"* disclosed on page 16, paragraph 1, lines 1-8

Regarding claim **8**, wherein said long term link-cost is gathered at intervals of length T_l is anticipated by "link cost measured over longer interval of time T_l" disclosed on page 16, paragraph 1, lines 1-8

Wherein said long term link-cost information is used to update successor set information for each router is anticipated by "*used by routing protocol to update the successor sets at each router"* disclosed on page 16, paragraph 1, lines 6-11; and

Wherein said long-term link cost information is utilized for initializing a near-optimum routing path is anticipated by is anticipated by " so that the new routing paths are the shortest paths under new traffic conditions" disclosed on page 16, paragraph 1, lines 6-11;

Regarding claim **9,** wherein short-term and long-term link cost information is maintained in tables at each router is anticipated by *"router's topology table"* disclosed on paragraph 1, page 11, lines 1-6.

Regarding claim **10**, wherein said tables comprise:

A main topology table T^i, or equivalent, in which information is maintained about the characteristics of each link known to the router i is anticipated by *"the main topology table T^i "* disclosed on page 10,paragraph 6, lines 1-2.

A neighbor topology table T^i_k, or equivalent, in which information is maintained about each neighbor k is anticipated by *"neighbor topology table T^i_k,"* disclosed on page 10,paragraph 7, lines 1-2

A distance table in which distance information is maintained from router i to each destination based on the topology in said main topology table is anticipated by *"The distance table stores"* disclosed on page 11,paragraph 1, lines 1-4.

A routing table in which information about routing paths to the destinations are maintained is anticipated by *"the routing table stores"* disclosed on page 11,paragraph 2, lines 1-2.

A link table in which link-cost information l^i_k is maintained for each neighbor k is anticipated by *"the link table"* disclosed on page 11,paragraph 3, line 1.

Regarding claim **11**, wherein the routing path information maintained in said routing table comprises:

Successor set S^i_j to each destination j is anticipated by *"Successor set S^i_j to each destination j"* disclosed on page 11,paragraph 2, lines 1-2 ; and

Feasible distance FD^i_j is anticipated by *"Feasible distance* FD^i_j*"* disclosed on page 11,paragraph 2, lines 1-2.

Regarding claim **12**, wherein the traffic allocation on a link substantially satisfies the following equation $\O_{jk} = \Psi (k,\{D^p_j + l^i_p \ I\ p\ E\ N^i\})\ K\ E\ N^i$, where O^i_{jk} is the routing path parameter and where Ψ is a flow allocation function is anticipated by *"equation 23* $\O_{jk} = \Psi (k,\{D^p_j + l^i_p \ I\ p\ E\ N^i\})\ K\ E\ N^i$*, where* O^i_{jk} *is the routing path parameter and where* Ψ *is a flow allocation function"* disclosed page 9.

Regarding claim **13**, wherein determining of multiple loop-free paths is performed according to an approximation of minimum delay routing is anticipated by *"flow allocation heuristics that approximate minimum delays along the predefined multiple loop-free paths"* disclosed on paragraph 5, lines 1-4.

Regarding claim **14**, a method of approximating minimum delay routing between source and destination within a computer network having a plurality of available paths by *"new frame work for approximate solutions to MDRP"* disclosed on page 3, paragraph 4, lines 1-11, comprising:

Deriving an approximation to the Gallager minimum-delay routing problem to determine near-optimal routes between said source and said destination is anticipated by *"approximation to the Gallager's minimum delay routing problem"* disclosed on page 1, paragraph 2, lines 1-3; and

Allocating routes according to said approximation based on link-sate information so as to provide multiple paths of unequal cost to each destination that are loop free is

anticipated by *"multiple paths of unequal cost to each destination that are loop free"* disclosed on page 1, paragraph 2, lines 4-6.

Regarding claim **15**, wherein said link -state information comprises:

Long-term link information containing information about the near-shortest routing path is anticipated by *"so that the new routing paths are the shortest paths under new traffic conditions"* disclosed on page 16, paragraph 1, lines 6-11;

Said long-term link further containing information about successor sets at each router is anticipated by *"long-term changes are used by the routing protocol to update successor sets at each router"* disclosed on page 16, paragraph 1, lines 6-11.

Short-term link information containing recent information about that state of the links for use in adjusting routing parameters at each router is anticipated by *"link cost measured over short intervals of length T_s are used for routing parameter computation"* disclosed on page 16, paragraph 1, lines 1-6.

Regarding claim **16**,wherein said short-term link information is updated more frequently than the long-term link information is anticipated by *"the value of T_l, however, should be such that it is sufficiently longer than the time it takes for computing the shortest path"* disclosed on page 17, paragraph 2, lines 1-6.

Regarding claim **17**,wherein short term link-cost information is computed by each router in response to information received within link state update messages, or equivalent is anticipated by *"each router has sufficient link-state information to compute shortest paths to all destination"* disclosed on page 10, paragraph 4, lines 1-3.

Regarding claim **18**, wherein said link-state update message indicate that an addition deletion or change in link-cost has occurred is anticipated by "information is exchanged between routers is a link-state update message" disclosed in page 11, paragraph 1, lines 1-3.

Regarding claim **19**, wherein allocating of said route does not require global synchronization on the network is anticipated by "*routing algorithm does not require any global variables or global synchronization*" disclosed on page 3, paragraph 4, lines 8-11

Whereby said routing method is able to respond to rapidly-changing traffic conditions within said network is anticipated by *"load balancing scheme based on some heuristic which can quickly adapt to dynamic traffic "*disclosed on page 7, paragraph 3, lines 1-5.

Regarding claim **20**, wherein global variables for the network do not need to be maintained is anticipated by "routing algorithm do not require any global variables to be maintained" disclosed on page 3, lines 8-11.

Regarding claim **21**,wherein short-term and long-term link cost information is maintained in tables at each router is anticipated by "*router's topology table*" disclosed on paragraph 1, page 11, lines 1-6.

Regarding claim **22**, wherein said tables comprise:

A main topology table T^i, or equivalent, in which information is maintained about the characteristics of each link known to the router i is anticipated by *"the main topology table T^i "* disclosed on page 10,paragraph 6, lines 1-2.

A neighbor topology table T^i_k, or equivalent, in which information is maintained about each neighbor k is anticipated by *"neighbor topology table T^i_k,"* disclosed on page 10,paragraph 7, lines 1-2

A distance table in which distance information is maintained from router i to each destination based on the topology in said main topology table is anticipated by *"The distance table stores"* disclosed on page 11,paragraph 1, lines 1-4.

A routing table in which information about routing paths to the destinations are maintained is anticipated by *"the routing table stores"* disclosed on page 11,paragraph 2, lines 1-2.

A link table in which link-cost information l^i_k is maintained for each neighbor k is anticipated by *"the link table"* disclosed on page 11,paragraph 3, line 1.

Regarding claim **23**, wherein the routing path information maintained in said routing table

Successor set S^i_j to each destination j is anticipated by *"Successor set S^i_j to each destination j"* disclosed on page 11,paragraph 2, lines 1-2 ; and

Feasible distance FD^i_j is anticipated by *"Feasible distance FD^i_j"* disclosed on page 11,paragraph 2, lines 1-2.

Regarding claim **24**, wherein said tables are maintained within by the executing of procedures within said routers, comprising:

A main topology update procedure (MTU) or equivalent is anticipated by *"Main Topology Update Algorithm"* disclosed on page 13, in Fig 3.

A multiple–path partial-topology dissemination procedure (MPDA), or equivalent, which is invoked when an event occurs to disseminate topology information to routers is anticipated by *"Multiple-path Partial-topology Algorithm"* disclosed on page 14, in Fig 4;

An initializing procedure for said multiple–path partial-topology dissemination procedure (INIT-PDA), or equivalent is anticipated by *"procedure (INIT-PDA)"* disclosed on page 11, in Fig 1.

A neighbor topology update procedure (NTU) for updating the topology of neighboring routers is anticipated by *"neighbor topology update procedure"* disclosed on page 12, in Fig 2.

Initial route assignment procedure (IH) for allocating near-optimal initial route between a source and a destination according to said long-term link-cost information is anticipated by *"Initial route assignment procedure (IH)"*disclosed on page 16, Fig .6; and

An incremental loading procedure (AH) which adjusts routing parameters according to said short-term link-cost information is anticipated by "An incremental loading procedure (AH)" disclosed on page 17, Fig .7

Regarding claim **25**, a method of allocating loop-free multi-path traffic routing between routers within a network having a plurality of routing paths between said source and said destination is anticipated by *"new frame work for approximating solution to MDRP"* disclosed on page 3, paragraph 4, lines 1-11 comprising:

Computing multiple loop-free paths between said routers is anticipated by *"multiple loop-free paths to destination"* disclosed on page 3, paragraph 4, lines 1-6;

Distributing traffic over said loop-free paths is anticipated by *"allocation of flows to destination along multiple loop-free paths"* disclosed on page 3, paragraph 4, lines 1-8; and

Updating link costs associated with said paths to optimize local traffic flow is anticipated by *"updating the link cost"* disclosed on page 8, paragraph 2, lines 5-8.

Regarding claim **26**, wherein the computing of said loop-free paths comprises:

Computing D^i_j using a shortest-path algorithm, or equivalent, based on link-state information is anticipated by *"computing D^i_j using a shortest-path algorithm"* disclosed on page 10, paragraph 2, lines 1-3.

Computing S^i_j by extending said shortest-path algorithm, to support multiple successors along the loop-free path to each destination is anticipated by *"computing S^i_j by extending said shortest-path algorithm"* disclosed on page 10, paragraph 2, lines 1-3.

Regarding claim **27**, wherein distributing traffic over said paths comprises:

Executing a heuristic algorithm IH, or equivalent, to determine an initial load assignment is anticipated by *"a heuristic algorithm IH to determine an initial load assignment"* disclosed on page 16, Fig 6.

Periodically executing a heuristic algorithm AH, or equivalent, to adjust the incremental load is anticipated by *"a heuristic algorithm AH to adjust the incremental load"* disclosed on page 17, Fig 7.

Regarding claim **28**, wherein updating link cost associated with said paths to optimize the traffic flow comprises:

Estimating marginal delay along each path is anticipated by *"on line estimation of marginal delays"*disclosed on page 18, paragraph 1`, lines 1-4; and

Communicating link-state update message (LSUs) which contain information about said marginal delay along said paths is anticipated by *"link state update message containing information change in cost of link"* on page 11, paragraph 1, lines 1-6.

Regarding claim **29**, a method of approximating delay between routers within a computer network having plurality of available paths by executing a distributed routing algorithm is anticipated by *"framework for near-optimum delay routing"*disclosed on page 9, paragraph 7, lines 1-4, comprising:

Determining a set of marginal distances D^i_j= min{D^k_j+ l^i_k I K E N^i} is anticipated by *"equation 20 (D^i_j= min{D^k_j+ l^i_k I K E N^i})"* disclosed on page 9.

Finding a feasible distance FD^i_j is anticipated by *"FD^i_j is called the feasible distance"* disclosed on page 9, paragraph 1 which satisfies the relationship $FD^i_j \leq D^i_j$, wherein K E N^i is anticipated by *"equation 21 or 16 $FD^i_j \leq D^i_j$, wherein K E N^i"* disclosed on page 9;

Determining a successor set S^i_j = {kI D^i_{jk}< FD^i_j Λ K E N^i} or equivalent is anticipated by *"equation 23 or S^i_j = {kI D^i_{jk}< FD^i_j Λ K E N^i}"* disclosed on page 9.

Allocating traffic *$Ø^i_{jk} = \Psi$ (k,{D^p_j +l^l_p I p E N^i}) K E N^i,* where O^l_{jk} is the routing path parameter and where Ψ is a flow allocation function is anticipated by *"equation 23 $Ø^i_{jk} = \Psi$ (k,{D^p_j +l^l_p I p E N^i}) K E N^i"* disclosed page 9.

Regarding claim **30**, a method of assuring loop free routing by a router executing a given routing algorithm and operated within a network having multiple paths between

sources and destinations is anticipated by *"Loop-free invariant (LFI) condition"* disclosed on page 8, paragraph 6-page 9, line1 –page 9, paragraph 1, lines 1-2;comprising:

Finding a feasible distance FD^i_j is anticipated by "FD^i_j is called the feasible distance" disclosed on page 9, paragraph 1 which satisfies the relationship $FD^i_j \leq D^i_j$, wherein K E N^i is anticipated by *"equation 16 $FD^i_j \leq D^i_j$, wherein K E N^i"* disclosed on page 9;

Determining a successor set $S^i_j = \{kl\ D^i_{jk} < FD^i_j \Lambda$ K E $N^i\}$ or equivalent is anticipated by *"equation 173 or $S^i_j = \{kl\ D^i_{jk} < FD^i_j \Lambda$ K E $N^i\}$"* disclosed on page 9.

Wherein any routing paths satisfying the above equation is assured of being a loop-free routing path is anticipated by *"Loop-free invariant (LFI) condition"* disclosed on page 8, paragraph 6-page 9, line1 –page 9, paragraph 1, lines 1-2.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Puneet Bhandari whose telephone number is 571-272-2057. The examiner can normally be reached on 9.00 AM To 5.30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Seema Rao can be reached on 571-272-3174. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Puneet Bhandari
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pb
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